III. LIMITING PRINCIPLES INHERENT IN THE ESSENTIAL FACILITIES DOCTRINE AND IN THE COMPETITIVE ANALYSIS OF DEMAND AND SUPPLY SUBSTITUTABILITY

94. Our definition of "necessary" and "impair" relies on the competitive analysis of demand and supply substitution that provides the primary basis for other areas of regulatory economics and provides the analytical basis for modern antitrust jurisprudence. In this Part, we first review the logic and limits of the essential facilities doctrine and examine its empirical implications with respect to defining relevant markets in both geographic and temporal dimensions.[159] Next, we apply that understanding of antitrust analysis to define our test of "impairment." We then extend our analysis to define "necessary" for purposes of section 251(d)(2). Finally, we discuss how related policies of the Commission may distort the conclusions derived from any application of the essential facilities doctrine or market power analysis to mandatory unbundling.

A. The Logic and Limits of the Essential Facilities Doctrine

95. The federal courts first applied the essential facilities doctrine to telecommunications networks in *MCI Communications Corp.* v. *American Telephone & Telephone Co.*[160] There, the Seventh Circuit refined the essential facilities doctrines into a four-part test that requires the plaintiff to show

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159. The following discussion directly responds to the FCC's request for "comment on the significance of the essential facilities standard under section 251(d)(2)." *SFNPRM, supra* note 1, at ¶ 21; *see also id.* at ¶¶ 22-23. Of necessity, our discussion here treats in summary fashion a topic that merits lengthier analysis. For a thorough and up-to-date examination, see Lipsky & Sidak, *supra* note 6.

(1) control of the essential facility by a monopolist;

(2) a competitor's inability practically or reasonably to duplicate the essential facility;

(3) the denial of the use of the facility to a competitor; and

(4) the feasibility of providing the facility.[161]

Inherent in the concept of an "essential facility" is the premise that the owner of that facility possesses monopoly power. The first two elements of the doctrine incorporate that recognition in a variety of ways. First, some degree of uniqueness and market control is inherent in the term "essential." Second, the inquiry regarding the impracticability of duplication ensures that the doctrine will apply only to facilities for which no feasible alternative exists or that cannot be reasonably reproduced. Finally, the term "facility" itself connotes an integrated physical structure or large capital asset with the degree of cost advantage or unique character that usually confers monopoly power and market control by virtue of its superiority for its intended purposes.

96. Although, as noted by Justice Breyer in *Iowa Utilities Board,* the Supreme Court has never endorsed the essential facilities doctrine,[162] seven Justices nonetheless agreed in that case that the doctrine might be useful, by analogy, as a limiting principle in interpreting the "necessary" and "impair" standards of section 251(d)(2) of the Telecommunications Act.[163]

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160. MCI Communications Corp. *v.* American Tel. & Tel. Co., 708 F.2d 1081 (7th Cir. 1982), *cert. denied*, 464 U.S. 891 (1983).

161. *Id.* at 1132–33.

162. *Iowa Utilities Board,* 199 S. Ct. at 753 (Breyer, J., concurring in part and dissenting in part) (concurring).

163. *Id.* at 734–35 (Scalia, J., for the Court); *id.* at 753 (Breyer, J., concurring in part and dissenting in part) (concurring).

A strength of the doctrine is that is has shown the capacity to screen out a multitude of unmeritorious claims.[164] In that respect, the doctrine plainly rejects the notion, embodied in the *Local Competition First Report and Order,* that the public interest is advanced by the simplistic rule that any compulsory sharing that is technically feasible to order shall be ordered. Indeed, as we shall show presently, the technical feasibility of access is a necessary but not sufficient condition for mandatory unbundling to advance consumer welfare.

97. It is inappropriate to apply the essential facilities doctrine to circumstances in which the owner of the facility lacks monopoly power in the market for the end service employing the input, because without monopoly power there can be no basis for applying antitrust principles and remedies. Justice Breyer seemed to make that point in *Iowa Utilities Board*:

> [A]lthough the provision describing which elements must be unbundled does not explicitly refer to the analogous "essential facilities" doctrine (an antitrust doctrine that this Court has never adopted), the [Telecommunications] Act [of 1996], in my view, does impose related limits upon the FCC's power to compel unbundling. In particular, I believe that, given the Act's basic purpose, it requires a convincing explanation of why facilities should be shared (or "unbundled") where a new entrant could compete effectively without the facility, or where practical alternatives to that facility are available.[165]

If the facility must compete for users with other products or services that are effective substitutes for access to the facility, the discipline imposed by such competition will suffice to control the conduct of the facility owner.

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164. *See* Lipsky & Sidak, *supra* note 6.

165. *Id.* at 753 (Breyer, J., concurring in part and dissenting in part) (concurring).

98. There will, of course, be instances in which the facility in question will be somewhat better than the alternatives, but not so much better as to preclude totally the continued survival of excluded parties. The colorful exchange between Justices Scalia and Souter about ladders and lightbulbs[166] confirmed that the Court in *Iowa Utilities Board* understood this concern in the context of mandatory unbundling of network elements under the Telecommunications Act. It may be difficult indeed to determine whether exclusion from the use of a particular facility will mean inconvenience, extinction, or some intermediate degree of harm to the excluded competitor. The point is not that the judgment as to the magnitude of the competitive disadvantage of exclusion is simpler in principle with one test instead of another. Rather, the point is that the question of "essentiality" and ease of duplication—measured by either the potential harm of exclusion or the potential benefit of inclusion—is no different from, and ought legally to be the same as, the issue of whether monopoly power is present in the market for the service produced with the allegedly "essential" facility. The focus of courts and regulators should be on whether mandatory access to the facility will enhance the long-term welfare of consumers, regardless of the effect on individual competitors.

99. Because a finding of monopoly power should be a prerequisite to any further inquiry, any market characteristic that prevents the exercise of market power should preclude the application of the essential facilities doctrine. Suppose, for example, that a pipeline is the only means of transporting oil from the field where it is produced to the city where it is consumed. Suppose further that some local topographical feature precludes construction of an

166. *Id.* at 735 n.11 (Scalia, J.) (quoting *id.* at 739 (Souter, J., concurring in part and dissenting in part)

alternative pipeline. At first it might appear that the refusal of the pipeline owner to permit competing oil distributors to ship their oil through the pipeline is an act of monopolization by virtue of the essential facilities doctrine. If oil is readily available to the region from another source, however, no monopoly constraint on pipeline output (or enhancement in price) would be rational or, in equilibrium, even possible. Alternatively, there may be an energy source that is a reasonable alternative for consumers of oil. In either case, the consequence would be that no method of transporting oil—regardless of the "facility" by which transport is supplied—could exercise monopoly power. The demand for use of the facility is a derived demand based on the underlying demand for the end product—in this case, consumers' use of energy.[167] The derived demand for the facility cannot confer greater market power on its owner than exists for the end product for which that facility would be an input. Under those circumstances, there is no basis to apply antitrust enforcement mechanisms because no change in the conduct of the facility owner would increase consumer welfare or improve resource allocation.

100. Facilities with otherwise identical characteristics may have different antitrust obligations, depending on available substitutes for the output of the facility. The only shopping mall in a geographically isolated locality may have antitrust obligations that are not shared by

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(dissenting)).

167. *See* Hartigan *v.* Panhandle E. Pipe Line Co., 730 F. Supp. 826, 866 (C.D. Ill. 1990) (defining the concept of "derived demand"); United States *v.* Standard Oil Co., 155 F. Supp. 121, 146 (S.D.N.Y. 1957) ("The demand for ocean tankers is a derived demand reflecting changes in the demand for petroleum and its products. An increase in the demand for crude and its products would ordinarily bring an increased demand for ocean tankers and an increase in ocean tanker rates."). The former Interstate Commerce Commission employed such analysis of demand and supply substitution in the 1980s when reforming rate-regulation principles for rail transportation supplied to "captive shippers." *Ex Parte* No. 347 (Sub.-No.1), Coal Rate Guidelines—Nationwide (unpublished decision issued Feb. 8, 1983); Coal Rate Guidelines, Nationwide, 1 I.C.C.2d 520 (1985); *see also* Burlington N. R.R. *v.* ICC, 985 F.2d 589, 595–99 (D.C. Cir. 1993) (Williams, J.).

an identical facility in the suburbs of a metropolis. Equally significant, the same facility may have different antitrust obligations depending on the time of the suit. The first shopping mall in a newly developed area may be found to have monopoly power—that is, the facility may be regarded as "essential"—and exclusion of competing retailers may well create liabilities under section 2 of the Sherman Act. The identical shopping mall, however, may lose such antitrust obligations once competing commercial real estate developments have emerged in the natural course of growth and the development of increased commercial real estate capacity. In short, the essential facilities doctrine should be *temporally bounded*, although courts have failed to recognize that requirement.

101. The foregoing analysis suggests why, in the vast majority of essential facilities doctrine cases, the federal courts have declined to find the facility in question "essential."[168] That pattern has prompted academic criticism of the essential facilities doctrine, including criticism by one of the present authors.[169] The criticisms of the essential facilities doctrine may reflect two underlying forces, one which is irrelevant to the FCC's interpretation of section 251(d)(2) and the other which underscores the need for a limiting principle.

102. First, remedies in essential facilities cases necessarily require some form of regulation. In other words, by hypothesis no remedy of mandated access can eliminate the

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168. Those decisions are surveyed in Lipsky & Sidak, *supra* note 6.

169. *See id.*; Donald I. Baker, *Compulsory Access to Network Joint Ventures Under the Sherman Act: Rules or Roulette?*, 1993 UTAH L. REV. 999 (arguing that the core conceptual problem with compulsory access orders is that mandating cooperation among businesses is futile); Philip E. Areeda, *Essential Facilities: An Epithet in Need of Limiting Principles*, 58 ANTITRUST L.J. 841 (1990) (arguing that no Supreme Court case has provided a consistent rationale for the doctrine or has explored either the social costs and benefits or the administrative costs of requiring the creator of an asset to share it with a rival).

underlying monopoly. Once identified, the role of judicial regulation (through consent decree) in essential facilities cases may be judged by the same standards applied to other forms of public control of natural monopolies. The central thesis derived from this analysis is that the wisdom of judicial regulation of essential facilities requires an assessment of the administrative complexity of the relief proposed. But this consideration is not applicable to a regulatory agency like the FCC, which already has the expertise and resources to administer a regime of mandatory access, if one is deemed necessary to impose.

103. The second criticism directed against the essential facilities doctrine concerns the incentives created by the doctrine and their dynamic effect on consumer welfare. As Justice Breyer noted in *Iowa Utilities Board*,[170] compulsory sharing of property has social costs because it truncates the returns to private investment, especially investment in innovative activity. There are obvious social costs when competitors, like children in a sandbox, are admonished to share. Any case in which the fundamental output of the facility consists of information or any other form of intellectual property seems a poor candidate for application of the essential facilities doctrine. The essential facilities doctrine is, above all, a legal rule of mandatory sharing and compulsory dealings. That characteristic alone is inconsistent with the exclusivity granted to innovators, which government has decided is appropriate to preserve their incentives to create new properties. The essential facilities doctrine, moreover, is most likely to condemn intellectual property in precisely those circumstances in which that result is least defensible: Under the essential facilities doctrine, the more an invention is unique,

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170. 119 S. Ct. at 753-54 (Breyer, J., concurring in part and dissenting in part) (concurring).

valuable, and difficult to duplicate, the greater is the obligation to share it. In short, essential facilities principles are inherently inconsistent with intellectual property protection.

104. This consideration regarding intellectual property has direct relevance to the FCC's interpretation of the "necessary" and "impair" requirements. The Telecommunications Act contains this solicitude for intellectual property, for section 251(d)(2) does not mandate the unbundling of a "proprietary" network element unless it satisfies *both* the "impair" standard *and* the "necessary" standard.[171] Furthermore, those two factors are what the Commission shall consider "at a minimum" when deciding whether to mandate unbundling.[172] The FCC's consideration of additional factors in appropriate cases should tighten rather than expand the focus of this authority to mandate unbundling in the public interest.

B. Deriving the "Necessary" and "Impair" Standards Based on the Lessons of the Essential Facilities Doctrine

1. The Standards Should Be Assessed with Temporal and Geographic Specificity

105. The FCC should interpret "necessary" and "impair" with temporal and geographic specificity. The FCC can usefully identify multiple geographic zones for unbundling purposes without imposing a uniform nationwide unbundling rule—let alone a uniform nationwide *presumption* or *outcome*.[173] Without temporal and geographic specificity to its mandatory unbundling rules, the FCC would create a body of law in direct conflict with the antitrust principles that the Court considered relevant to interpreting section 251(d)(2). The resulting

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171. For proprietary network elements, the statutory requirement is conjunctive: "necessary . . . *and* . . . impair." 47 U.S.C. § 251(d)(2) (emphasis added).

172. *Id.*

173. *Cf. SFNPRM*, *supra* note 1 (separate statement of Commissioner Powell).

vision of competition would at best bear no relation to a rigorous economic understanding of the term "necessary" or "impair" and at worst be affirmatively harmful to consumers.

106. The *Second Further Notice of Proposed Rulemaking*, however, incorrectly concluded that establishment of minimum national unbundling requirements remains valid under the Court's decision in *Iowa Utilities Board.*[174] The FCC could "find nothing in the Supreme Court's decision that calls into question our decision to establish minimum national unbundling requirements." [175] That statement is remarkable because Justice Scalia's reference to supply substitution for the ILEC's network elements presupposes a competitive analysis that must begin by defining relevant product and geographic markets. The references by Justices Scalia and Breyer to the essential facilities doctrine reinforces the premise that competition must be evaluated with respect to a meaningful geographic market. The FCC's tentative conclusion about the need to impose nationwide unbundling requirements is inconsistent with the holding in *Iowa Utilities Board* because that conclusion is inconsistent with the underlying technology used to provide local telephone service and with the analysis in a number of previous Commission decisions.[176] Consider residential telephone service. The basic technology to provide circuit-switched local telephone service to residential customers is essentially the same throughout the United States.[177] But, as discussed in many prior Commission

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174. *SFNPRM*, *supra* note 1, at ¶ 14.

175. *Id.*

176. *See, e.g.*, Applications of NYNEX Corp., Transferor, and Bell Atlantic Corp., Transferee, for Consent to Transfer Control of NYNEX Corp. and Its Subsidiaries, Memorandum Opinion and Order, 12 F.C.C. Rcd. 19,985, 20,014-19 ¶¶ 49-57 (1997).

177. *See, e.g.*, BELL COMMUNICATIONS RESEARCH, BOC NOTES ON THE LEC NETWORK (Bellcore 1994); BELL COMMUNICATIONS RESEARCH, TELECOMMUNICATIONS TRANSMISSION ENGINEERING: PRINCIPLES (Bellcore 1990).

decisions and contained in significant amounts of U.S. telecommunications policy, costs differ greatly among different geographical areas. Since the technology being employed is essentially the same, the conclusion follows that features of the geographical areas lead to the large variation in costs.[178] Indeed, the FCC discusses economies of scale and economies of density that lead to those differences in costs.[179] Those differences in costs would be expected to lead to differences in competition.[180]

107. When the density of customers is high enough and the number of customers is large enough in a given geographical area, the economies of scale and density will either be exhausted or will become sufficiently small so as not to have an economic effect of any significant magnitude. In that situation, an ILEC will not have an economic advantage, and economic analysis leads to the prediction of significant CLEC entry. Indeed, Commissioner Powell correctly recognized the principle that, when competitors already exist in a particular market, other firms would not be impaired in their ability to compete if they do not have unbundled access to the ILEC's network elements, let alone unbundled access at TELRIC prices.[181] Furthermore, that economic analysis is confirmed by the finding that facilities-based CLECs are much more prevalent in urban, high-density areas, than in more rural areas.[182]

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178. *See, e.g.,* ROBERT W. CRANDALL & LEONARD WAVERMAN, TALK IS CHEAP: THE PROMISE OF REGULATORY REFORM IN NORTH AMERICA 75–85 (Brookings Institution 1995).

179. *SFNPRM, supra* note 1, at ¶ 26.

180. Indeed, the definition and geographical scope of the local access and transport areas (LATAs) took account of customer density and its expected effect on long-distance competition. *See, e.g.,* HUBER, KELLOGG & THORNE , *supra* note 71, at 227–34.

181. *SFNPRM, supra* note 1 (separate statement of Commissioner Powell).

182. *See* INDUSTRY ANALYSIS DIVISION, COMMON CARRIER BUREAU, FEDERAL COMMUNICATIONS COMMISSION, REPORT—LOCAL COMPETITION 2 (Dec. 1998) [hereinafter 1998 LOCAL COMPETITION REPORT].

108. The employment of a single nationwide standard would be in direct contradiction to the market definition standards found in the Department of Justice and Federal Trade Commission *Merger Guidelines,*[183] which the FCC has used in its own recent merger reviews under the public interest standard of the Communications Act.[184] In terms of geographic market definition, the *Merger Guidelines* ask whether a hypothetical (unregulated) monopolist could impose a "small but significant and nontransitory" increase in price (that is, raise price above competitive levels).[185] That standard is established by determining whether the hypothetical monopolist would have market power or, alternatively, would be constrained by firms outside the market.[186]

109. In a given geographic market, the correct question is whether an (unregulated) ILEC could exercise market power if it were not required to provide its competitors a given unbundled element at regulated cost-based rates. If other CLECs are already providing competing services using the element, or if the element itself is available from non-ILEC suppliers, then an ILEC could not exercise market power. Provision of the unbundled element by the ILEC would not be necessary for competition in telecommunications services in the given geographic area. Nor would competition be impaired if the ILEC were not required to supply the unbundled element at cost-based rates. It is likely, however, that the outcome of

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183. *Merger Guidelines*, *supra* note 15, at § 1.2.

184. *See, e.g.*, Application of WorldCom, Inc. and MCI Communications Corporation for Transfer of Control of MCI Communications Corporation to WorldCom, Inc., Memorandum Opinion and Order, CC Dkt. No. 97-211, 13 F.C.C. Rcd. 18,025, 18,048-50 ¶¶ 37-39 (1998) (citing *Merger Guidelines*).

185. *Merger Guidelines, supra* note 15, at § 1.21.

186. This approach is similar to that found in economics textbooks, *see, e.g.*, CARLTON & PERLOFF, *supra* note 16, at 801-08, and in the legal literature, *see, e.g.*, Landes & Posner, *supra* note 14.

that analysis would differ depending on the particular element and the geographical area under consideration.

110. As an example, consider transport. In a densely settled area with a high population, such as eastern Massachusetts around Boston (the eastern Massachusetts LATA), numerous competitors currently provide transport competition to Bell Atlantic. In rural areas of western Massachusetts, however, competitor provision of transport is considerably less developed. Furthermore, Bell Atlantic's costs of providing local service and transport vary significantly between eastern Massachusetts and western Massachusetts. Thus, hypothetically Bell Atlantic might be able to increase the price of transport in rural areas of western Massachusetts above competitive levels, but it could not do so in eastern Massachusetts. Bell Atlantic's competitors need not provide transport to every location in eastern Massachusetts for transport to be competitive. Because Bell Atlantic is required to offer transport under tariff by using nondiscriminatory prices, Bell Atlantic needs to lose only a relatively small share of its overall transport business in eastern Massachusetts for an attempted price increase to be unprofitable. Thus, if competitors offer competitive transport to a sufficient number of locations in eastern Massachusetts, competition will effectively constrain Bell Atlantic's prices. Thus, the added regulatory mandate that Bell Atlantic provide CLECs unbundled transport elements in eastern Massachusetts at TELRIC prices will *not* affect competition. Transport does not meet that interpretation of the "impair" standard in eastern Massachusetts. Thus, as this example illustrates, it will be necessary for regulators to make separate determinations under the "impair" standard for different geographic areas.

111. It is conceivable that a CLEC would argue that its ability to provide an end service to consumers would be impaired for purposes of section 251(d)(2) if the ILEC did not *simultaneously* unbundle a particular element throughout the ILEC's entire service territory. There are two fallacies with such reasoning. First, it presumes that the service territory is identical to the relevant geographic market. That will be a factual question, but in general we observe ILEC service territories spreading over far larger expanses than one would typically regard as a single geographic market for purposes of competitive analysis. Second, the argument misconceives how entry occurs and how much entry is necessary to impart competition to a market. Entrants target their customers, and competition takes *place on the margin*. As our discussion of critical share demonstrates, it is the marginal consumers rather than the inframarginal consumers whose choices determine the competitiveness of a market. The argument that competition would be impaired unless a CLEC can simultaneously serve *all* consumers, marginal and inframarginal alike, overstates the critical share of the ILEC's customers that is necessary for the CLEC to capture to produce a competitive equilibrium.

112. In summary, whether the FCC should mandate the unbundling of a particular network element in a particular geographic location at a particular time should depend on whether such unbundling is necessary to permit the competitive supply of telecommunications services to end users. The correct meaning of "impair" for purposes of section 251(d)(2) is whether the ILEC's failure to unbundle a particular network element, at a TELRIC price, in a particular geographic location at a particular time would produce an equilibrium supply of telecommunications services that was, relative to the competitive equilibrium, significantly inferior for consumers.

2. The Standards Should Incorporate Derived Demand

113. An olive is necessary for a good martini. But that does not make an olive an essential facility, which Rick should be obliged to offer for sale, at cost, to every other saloon keeper in Casablanca. Although a particular network element may be essential to producing a bundle of services in a particular manner, the existence of competition among bundles of services limits the extent to which that element is essential to the competitive supply of telecommunications services. Specifically, the development of wireless voice, data, and vertical services has served to increase the availability of substitutes for wireline access. That reasoning is analogous to the economic concept of derived demand, which has been incorporated in antitrust and regulatory law for many years. In the context of section 251(d)(2), the relevant question is whether competition among bundles of services produces for a particular network element a sufficiently low level of derived demand that makes it inessential to producing a competitive equilibrium.

114. In the language of economics, "necessity" and competitive "impairment" are given rigorous economic meaning by computing the price elasticity of derived demand for any given unbundled network element. That exercise is a direct application of insights in microeconomic theory that were explicated early in the twentieth century by the great British economist, Alfred Marshall.[187] Later, in his classic text on price theory, the late Nobel laureate George Stigler wrote, "Since the demand for a productive service is indirectly created by the demand for the product in whose production it is used, the demand for the service is said to be a derived

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187. *See* 5 MARSHALL, *supra* note 7, at ch. 6.

demand."[188] Marshall demonstrated (and Stigler reiterated) that the elasticity of derived demand for an input varies directly with (1) the elasticity of demand for the product that the factor produces; (2) the share of the factor in the cost of production; (3) the elasticity of supply of the other factor(s); and (4) the elasticity of substitution between the factor in question and the other factor(s).[189]

115. The application of Marshall's rules of derived demand can illuminate whether the demand for a given network element is so inelastic (that is, the quantity demanded is not sensitive to changes in price) that it could not be considered a necessary element. The availability of close substitutes to traditional wireline service such as wireless applications serves to increase the elasticity of demand for wireline service and hence, by Marshall's first rule, tends to increase the elasticity of demand for *all* of the ILEC's network elements used to produce voice telephony. As wireless prices approach wireline prices, fixed (as opposed to mobile) customers begin to substitute wireless telephones for landline telephones. Some evidence today already indicates an interest on the part of wireless carriers to serve fixed customers. By February 1999, AT&T had begun offering digital wireless service in Plano, Texas, in a package designed to attract customers interested in second lines for their businesses or homes.[190] By offering consumers a $40 monthly package of unlimited local calling bundled with voicemail, caller ID, call waiting, call forwarding, three-way conferencing, and ten-cents-

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188. STIGLER, *supra* note 18, at 252; *see also* THE NEW PALGRAVE, *supra* note 58, at 813 ("the demand for intermediate goods is *derived* from the demand for the final goods they help produce").

189. Marshall first derived those conditions for the two-factor case, given constant returns to scale. *See* LAYARD & WALTERS, *supra* note 17, at 259.

190. Jennifer Files, *AT&T Tests Mobile Phone Promotion: Plano Plan Casts Alternative to 2nd Home Line*, DALLAS MORNING NEWS, Nov. 12, 1998, at 1D.

per-minute long-distance service, AT&T has positioned itself to attract second-line customers to its standard wireless service.

116. For ease of exposition, we apply the remaining rules of derived demand to loops in particular. According to Marshall's second rule, the price elasticity of derived demand for a network element should rise as the share of the element in the network costs rises. The intuition is as follows: Suppose that the price of a network element, which represents a large portion of the total costs, doubles. Because the price of total network costs would rise substantially, the demand for additional network services would fall, and hence the demand for unbundled access to that particular network element would fall. An example of a network element that represents a large portion of the ILEC's total network costs is the loop. Thus, Marshall's second rule implies that the price elasticity of derived demand for loops would be larger than for other network elements, *ceteris paribus*, and hence unbundled loops would be less likely to be considered necessary for competition.

117. According to Marshall's third rule, the price elasticity of derived demand for a loop should increase with the elasticity of *supply* of another network element, such as a switch. Intuitively, the more price elastic the supply of switches, the less the price of switches will fall with a given reduction in the quantity of switches employed, and hence the greater must be the reduction in the quantity employed of loops. As other network elements such as switches and network interface devices (NIDs) have become increasingly competitively supplied,[191]

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191. For an example of competition in the switching industry, see Susan Breidenbach, *Switching Grows Up: The Entire Report*, Network World, May 4, 1998 (available at http://www.nwfusion.com/news/0504switch9.html).

Marshall's third rule of derived demand implies that the price elasticity of derived demand for loops should be rising.

118. Finally, according to Marshall's fourth rule, the price elasticity of derived demand for a loop should increase with an increase in the cross-price elasticity of substitution between a loop and other network elements. If network elements are used in fixed proportion, then the cross-price elasticity of substitution between a loop and another network element would be small. In that case, Marshall's fourth rule of derived demand would be the only one of the four rules that does not imply a large price elasticity of derived demand for loops. On the other hand, if technological change permits network elements to be used in variable proportions, substitution will occur across network elements and Marshall's fourth rule of derived demand will have relevance.

3. The Relevant Product Market and Critical Share

119. The 1992 *Merger Guidelines* specify that relevant markets for merger analysis may be defined for classes of customers on whom a hypothetical monopolist of the merging firms' products would likely impose a discriminatory price increase. [192] Although the DOJ and FTC had attempted before 1992 to define markets on the basis of the feasibility of price discrimination, the explicit endorsement of that approach by the 1992 *Merger Guidelines* has increased use of this practice by those agencies.[193] According to the *Merger Guidelines*, the

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192. *Merger Guidelines, supra* note 15.

193. For recent examples of the use of the price discrimination approach of merger guidelines by the FTC in the petroleum market, see William J. Baer, *Prepared Statement of the Federal Trade Commission On the Role of the Commission in Enforcing the Antitrust Laws to Protect Consumers in the Petroleum Industry*, as delivered before the Subcommittee on Energy and Power, House Committee on Commerce (Mar. 10, 1999) (available at http://www.ftc.gov/os/1999/9903/exxonmobiltestimony.htm). For similar use of the *Merger Guidelines* with

task of defining the relevant product market when price discrimination is not feasible involves identifying the smallest set of products for which a hypothetical monopolist could profitably raise price a significant amount (typically 5 percent) above the competitive level for a sustained period of time, which is normally assumed to be two years.[194] Thus, under the *Merger Guidelines*, a potential market definition is too narrow if, in the face of a 5 percent price increase, the number of customers who would switch to products outside the "market" is sufficiently large to make the price increase unprofitable.

120. Economists refer to the customers who decide not to purchase the product (or to purchase less of the product) at the increased price as "marginal" consumers. For small price increases they switch from the products inside the putative "market." Not all customers, however, are marginal customers. Indeed, in the typical case, most customers would continue to purchase the product despite the higher price because their willingness to pay for the product exceeds the raised price. Economists refer to such customers as "inframarginal" consumers.

121. In the presence of high demand elasticity and high supply elasticity, a firm cannot exercise unilateral monopoly power by attempting to decrease its supply.[195] Demand elasticity is captured by a customer's willingness to switch to competing suppliers as relative

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respect to the airline industry, see Department of Justice, *Comments of the Department of Justice*, Dkt. No. OST-97-2058, *Joint Application of American Airlines, Inc. and British Airways PLC for Approval of and Antitrust Immunity for Alliance Agreement* (May 21, 1998) (available at http://www.usdoj.gov/atr/public/comments/1777.htm).

194. *See Merger Guidelines*, *supra* note 15, § 1.11. For convenience, we will use the 5 percent level, although for some purposes a 10 percent level may be more appropriate.

prices change. Thus, a broad range of available substitutes would imply a high own-price elasticity of demand. Following the same logic as the market definition criteria, the *Merger Guidelines* provide a concrete test for evaluating the competitiveness of a market as captured in the idea of market power, which is the ability of a single firm unilaterally to increase price above the competitive level for a significant period of time.[196] The *Merger Guidelines* emphasize the own-price elasticity of demand, while other analyses focus on the cross-price elasticity of demand. But the two elasticity measures are closely related.[197]

122. Because competition takes place at the margin, only a small proportion of the ILEC's customers needs to defect to defeat its attempted price increase. In a simple example, it is possible to calculate that necessary proportion. Suppose that an ILEC attempted to increase prices on end-user access by 5 percent. How much traffic would that ILEC need to lose before the increase would be unprofitable? The formula to calculate that "critical share" is:

$$(1 - MC/P)\, Q_1 \leq (1.05 - MC/P)\, Q_2.$$

An important empirical fact for network elements is that fixed costs are a very large component of the overall cost, so that marginal cost is a relatively small component. Assume, for

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195. The importance of demand elasticities and supply elasticities has long been recognized in law and economics as important to assess the possibility of the exercise of unilateral market power. *See* Landes & Posner, *supra* note 14.

196. *See Merger Guidelines*, *supra* note 15, § 1.11. The other type of monopoly power recognized by the *Merger Guidelines* is coordinated interaction among all suppliers of a product. Such a possibility is not relevant here because competitors of an ILEC have very different cost structures and product offerings. Moreover, it is far-fetched to imagine firms such as AT&T and MCI WorldCom attempting to achieve coordination interactions with the RBOCs and GTE.

197. The own-price elasticity of demand is the percentage change in demand when the product's own price is raised by say 10 percent. The cross-price elasticity of demand is the percentage change in demand in response to the change in a competitor's price by, say, 10 percent. The two elasticity measures are related by the Slutsky equation in economic theory. The share-weighted (negative) own-price elasticity of demand equals the sum of the share-weighted cross-price elasticities of demand. *See, e.g.*, HENDERSON & QUANDT, *supra* note 154, at 22-24.

example, that the ratio of marginal cost to price, *MC/P*, is 0.2. Thus, we calculate Q_2 to be $0.94Q_1$, so that the critical share is 6 percent. Thus, if the ILEC attempts to raise its price by 5 percent, and if, as a result, it loses more that 6 percent of its traffic, the attempted price increase would be unprofitable and thus unilaterally rescinded.[198]

C. A Proposed Test for the "Impairment" Standard

123. As our discussion makes clear, the existing essential facilities doctrine sets forth necessary but not sufficient conditions for defining "impairment" under section 251(d)(2).[199] The complete set of necessary and sufficient conditions includes a fifth requirement, responsive to the explicit text of section 251(d)(2), to address whether the denial of access to that network element at TELRIC prices would impair competition at the end-user level. Our five-part test is as follows:

The FCC shall mandate unbundling of a network element if and only if

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198. For a more extensive discussion of critical share, see Jerry A. Hausman, Gregory K. Leonard & Christopher A. Vellturo, *Market Definition Under Price Discrimination*, 64 ANTITRUST L.J. 367 (1996).

199. We have previously argued that the essential facilities doctrine identifies necessary, but not sufficient, conditions for mandatory unbundling at long-run incremental cost. *See* Hausman, *Regulation by TSLRIC, supra* note 138, at 22 ("Economic principles suggest that only the 'essential facility' elements of the network, which cannot be economically reproduced in the short run by new competitors, should be unbundled by regulation."); Paul W. MacAvoy & J. Gregory Sidak, *What Is Wrong with American Telecommunications?*, MULTIMEDIA UND RECHT, Mar. 1999, at 15, 15 ("Surely it is economic folly to mandate unbundling of any network element that is not 'essential' in the antitrust sense—that is, a network element that cannot be readily duplicated by the entrant or procured at competitive prices from the same vendors who supply the element to the incumbent firm subject to the unbundling obligation."). *See also* Robert W. Crandall, Managed Competition in U.S. Telecommunications 17 (AEI-Brookings Joint Center for Regulatory Studies, Working Paper 99-1, Mar. 1999) ("the decision to unbundle everything and to require its leasing at cost-based rates is wildly excessive"). For a similar conclusion by German scholars, applying American antitrust principles to German telecommunications law, see CHRISTOPH ENGEL & GÜNTER KNIEPS, DIE VORSCHRIFTER DES TELEKOMMUNIKATIONSGESETZES ÜBER DEN ZUGANG ZU WESENTLICHEN LEISTUNGEN (Nosmos Verlagsgesellschaft 1998); Christoph Engel, *Der Weg der deutscher Telekommunikation in den Wettbewerb,* MULTIMEDIA UND RECHT, Mar. 1999, at 7, 12–13. As noted earlier, *see* text accompanying notes 140-41 *supra*, Canada employs an essential facilities approach to mandatory unbundling.

(1) it is technically feasible for the ILEC to provide the CLEC unbundled access to the requested network element in the relevant geographic market;

(2) the ILEC has denied the CLEC use of the network element at a regulated price computed on the basis of the regulator's estimate of the ILEC's total element long-run incremental cost;

(3) it is impractical and unreasonable for the CLEC to duplicate the requested network element through any alternative source of supply;

(4) the requested network element is controlled by an ILEC that is a monopolist in the supply of a telecommunications service to end-users that employs the network element in question in the relevant geographic market; and

(5) the ILEC can exercise market power in the provision of telecommunications services to end-users in the relevant geographic market by restricting access to the requested network element.

It is clear that the FCC's requirement of any "technically feasible" unbundling, articulated in the *Local Competition First Report and Order*, is subsumed within our framework and hence demonstrated as properly being a necessary, but not sufficient, condition for mandatory unbundling at TELRIC prices. Moreover, we have rearranged the order of the requirements in increasing degree of evidentiary burden. Stated another way, if a CLEC cannot demonstrate that a network element meets the first requirement, then that element is immediately declared inessential, and society is spared the expenditure of the resources needed to perform the more intensive analysis required in the subsequent parts of the test.[200]

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200. We focus here on the "impairment" standard. As we shall explain presently, our understanding of the "necessary" standard is that it would raise the bar of our five-part test in cases where the desired element embodied some type of intellectual property to which the ILEC had a legally recognizable form of protection.

124. To implement the fifth element of our test, one needs to modify the *Merger Guideline*'s test for unilateral market power only slightly to address the relevant question in the *Second Further Notice of Proposed Rulemaking*—namely, whether it would impair competition for an ILEC not to sell a particular unbundled network element to a CLEC at a TELRIC price.[201] Intuitively, our impairment test asks whether the ILEC can exercise market power when restricting access to a particular network element to the CLEC in a particular geographic market. If the ILEC cannot exercise market power (in the output market) when declining to offer a particular network element at a TELRIC price, then all of the consumer benefits associated with a competitive outcome have already been secured. Therefore, the regulator should not order the network element in question to be unbundled. In contrast to the method employed by the Commission, our test is focused on protecting competition as opposed to competitors.

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201. Assume, as the Telecommunications Act requires (*see* 47 U.S.C. §§ 251(c)(2)(D), 251(c)(3), 252(d)(1)(A)(ii)), that the ILEC must charge nondiscriminatory prices for end-user access. If the hypothetical monopolist has the ability to identify the inframarginal customers, it will have the incentive to charge customers different prices depending on their willingness to pay for the product. Thus, even though the hypothetical monopolist may not find it profitable to raise price 5 percent above the competitive level uniformly across all its customers, it may find it profitable to raise price 5 percent to some of its customers.

Let $c\ (p,\ u_n)$ be the critical share of customers that the ILEC must lose to deter the ILEC from raising end-user access above p when all elements except the n^{th} network element are available to CLECs at competitive prices. For example, $c(30,\ 2)$ indicates the critical share of customers the ILEC must lose to deter the ILEC from raising end-user access above $30 when all elements except the second network element are available to CLECs at competitive prices. Additionally, let $q\ (p)$ be the residual demand for end-user access faced by the ILEC for any given end-user access price p. We are now ready to state our proposed test for the "impairment" standard of section 251(d)(2):

> **Impairment Test**: Assume within a market that, by regulatory fiat, the ILEC must charge nondiscriminatory prices. The regulator should mandate unbundling of some network element n at its TELRIC price only when $1 - [q\ (1.05p)\ /\ q\ (p)] < c\ (p,\ u_n)$.

Stated another way, if the share of departing ILEC customers, $1 - [q\ (1.05p)\ /\ q\ (p)]$, exceeds the critical share that the ILEC can profitably sustain, $c\ (p,\ u_n)$, then the ILEC could not exercise market power.

125. What market forces may prevent, in general, the ILEC from successfully implementing that price increase? There are at least three such forces. First, if the ILEC attempts to raise the output price, CLECs will find it profitable to increase their supply of the output. CLECs could self-supply the network element in question (for example, switches) or purchase the use of the element from non-ILEC sources (for example, transport). Second, if the ILEC raises price, customers will shift their demand to competing forms of access, such as cable telephony or wireless for residential customers and CAPs for business customers. With its proposed acquisition of MediaOne and TCI and its proposed joint venture with Time-Warner, AT&T has positioned itself to serve 95 percent of all households in the United States. It is not economically rational to claim that AT&T, MCI WorldCom, and all the other CLECs would conspire to keep landline access prices above the competitive level. Thus, the "critical share" analysis described above would indicate that, in many situations, CLECs would find it profitable to replace the ILEC's reduction in supply and thereby defeat any attempted exercise of unilateral market power by the ILEC. Third, falling wireless prices will continue to displace traditional wireline users. Those three constraining forces make it implausible that the ILEC could exercise market power as defined by the *Merger Guidelines*. If market forces can protect consumers from the harms of monopolization, then the Commission should not impose mandatory unbundling.

126. Some might argue that the *Merger Guidelines* approach simply highlights that ILECs have high market shares for certain services, such as residential access. But that reasoning is fallacious. Professor William E. Landes and Judge Richard A. Posner have noted that high market shares in a price-regulated industry are either meaningless from a competitive

perspective or indicative of prices that are set at or below marginal cost—that is, at or below the price that would obtain in a competitive equilibrium:

> To the extent that regulation is effective, its effect is to sever market power from market share and thus render our analysis inapplicable. This is obviously so when the effect of regulation is to limit a monopolist's price to the competitive price level. A subtler effect should also be noted, however. Regulation may increase a firm's market share in circumstances where only the appearance and not the reality of monopoly power is created thereby. For example, in many regulated industries firms are compelled to charge uniform prices in different product or geographical markets despite the different costs of serving the markets. As a result, price may be above marginal cost in some markets and below marginal cost in others. In the latter group of markets, the regulated firm is apt to have a 100% market share. The reason is not that it has market power but that the market is so unattractive to sellers that the only firm that will serve it is one that is either forbidden by regulatory fiat to leave the market or that is induced to remain in it by the opportunity to recoup its losses in its other markets, where the policy of uniform pricing yields revenues in excess of costs. In these circumstances, a 100% market share is a symptom of a lack, rather than the possession, of market power.[202]

That assessment is directly relevant to the familiar assertion that an ILEC must possess market power because it has a high share of customers for a particular service. That reasoning is incorrect. Landes and Posner noted that in such a case "the causality between market share and price is reversed. Instead of a large market share's leading to a high price, a low price leads to a large market share; and it would be improper to infer market power simply from observing the large market share."[203] The Ninth Circuit well described that relationship when it said: "Reliance on statistical market share in cases involving regulated industries is at best a tricky enterprise and is downright folly where . . . the predominant market share is the result of regulation. In such cases, the court should focus directly on the regulated firm's ability to

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202. Landes & Posner, *supra* note 14, at 975–76.

control prices or exclude competition."[204] Our proposed test for the "impairment" standard would provide that proper focus. Moreover, our "impairment" test would provide the FCC with "a mechanism for removing particular elements from the unbundling requirements" and for declining to subject particular elements to mandatory unbundling in the first place.[205]

D. A Proposed Test for the "Necessary" Standard

127. As we noted in Part I, the elements of the test for establishing "impairment" are necessary, but not sufficient, conditions for the mandatory unbundling of a network element that is "proprietary in nature." For any element embodying a form of legally protected intellectual property, the "necessary" standard of section 251(d)(2) would apply. For such an element, the Commission should recognize that a heightened standard, beyond impairment of competition, should apply because of the importance to consumer welfare of innovation that leads to the creation of intellectual property and because of the uncertainty of successful outcomes that is inherent in the innovative process.[206] For these purposes, we accept as relevant to section 251(d)2) the definition of intellectual property contained in the *Antitrust*

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203. *Id.* at 976.

204. Metro Mobile CTS, Inc. *v.* NewVector Communications, Inc., 892 F.2d 62, 63 (9th Cir. 1989); *accord*, Consolidated Gas Co. of Fla. *v.* City Gas Co., 880 F.2d 297, 300 (11th Cir.), *vacated and reh'g granted*, 889 F.2d 264 (11th Cir. 1989), *on reh'g*, 912 F.2d 1262 (11th Cir. 1990), *rev'd per curiam on other grounds*, 499 U.S. 915 (1991).

205. *SFNPRM, supra* note 1, at ¶ 37.

206. It has long been recognized in the economics literature that the private incentive to innovate is too low relative to the socially optimal outcome that maximizes consumer welfare even when a patent is granted. *See, e.g.*,. JEAN TIROLE, THE THEORY OF INDUSTRIAL ORGANIZATION 389-415 (MIT Press 1988). The Commission will further decrease the already insufficient incentive to innovate if it requires mandatory unbundling of elements based on intellectual property and requires them to be sold at TELRIC-based prices.

Guidelines for the Licensing of Intellectual Property, issued in 1995 by the Department of Justice and the Federal Trade Commission.[207]

128. Although, as noted in Part I, the Commission relied on a dictionary definition for "impairment," it appears to have defined "necessary" without any similar reliance on a dictionary. The FCC stated: "'Necessary' means, in this context, that an element is a prerequisite for competition."[208] The proper dictionary definition of "necessary," however, is considerably more emphatic than the FCC's definition. The *Oxford English Dictionary* gives "necessary" the following primary definition: "Indispensable, requisite, essential, needful; that cannot be done without."[209] Similarly, *Webster's* defines "necessary" as "absolutely required; indispensable."[210]

129. The Commission then compounded its definitional problems by incorrectly subsuming "necessary" within the definition of "impair": "We believe that, in some instances, it will be 'necessary' for new entrants to obtain access to proprietary elements (e.g., elements with proprietary protocols or elements containing proprietary information), because without such elements, their ability to compete would be significantly impaired or thwarted."[211] By principally relying on "impairment" to define "necessary," the Commission created a logical circularity that failed to differentiate the two requirements.

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207. U.S. Department of Justice & Federal Trade Commission, Antitrust Guidelines for the Licensing of Intellectual Property § 1.0 & n.1 (patents, copyrights, trade secrets, and know-how agreements). The *Guidelines* state: "The intellectual property laws and the antitrust laws share the common purpose of promoting innovation and enhancing consumer welfare." *Id.* at § 1.0.

208. *Local Competition First Report and Order*, *supra* note 8, 11 F.C.C. Rcd. at 15,641-42 ¶ 282.

209. 10 OXFORD ENGLISH DICTIONARY 275 (Oxford University Press 2d ed. 1989).

210. WEBSTER'S II NEW RIVERSIDE UNIVERSITY DICTIONARY 787 (Riverside Publishing Co. 1988).

211. *Local Competition First Report and Order*, *supra* note 8, 11 F.C.C. Rcd. at 15,641-42 ¶ 282.

130. While our impairment of competition standard is based on the ability of an ILEC to exercise significant market power for a service in the absence of unbundling, in the case of a proprietary element based on intellectual property we recommend a standard that provides for unbundling only if competition is impossible in the absence of unbundling. Thus, an ILEC might retain some degree of market power based on the intellectual property, as currently happens with respect to intellectual property in the rest of the economy.[212] However, so long as competition is possible without the use of the ILEC's intellectual property, economic incentives will exist for ILECs and CLECs to negotiate an agreement over terms, because the ILEC will not be able to control competitive entry into the market for end-user services by means of its control of the intellectual property. We refer to our approach for proprietary elements based on intellectual property as the "absolutely essential" standard because unbundling is appropriate only when the element is truly necessary for competition.

IV. APPLYING THE PROPOSED TEST FOR "IMPAIRMENT" TO SPECIFIC NETWORK ELEMENTS

131. The consumer-welfare approach described in Part III not only guides our understanding of the "necessary" and "impair" standards, but also lends itself naturally into a decision framework for determining whether a particular network element in a particular market requires unbundling. We now apply our impairment test to the seven network elements in the *Second Further Notice of Proposed Rulemaking*, as well as to several additional network elements that embody new technologies or make possible new services. We understand Justices Scalia and

212. *See, e.g.*, David J. Teece & Mary Coleman, *The Meaning of Monopoly: Antitrust Analysis in High-*

Breyer to imply that there this an established body of antitrust case law that provides guidance on the application of the first four parts of our impairment test. Thus we focus primarily on how the fifth part of our test should be applied to network elements. The clear point that emerges from this analysis is that determining whether a particular network element in a particular geographic area actually is an essential facility requires a close empirical investigation based on the specific facts in that geographic market. In the sections that follow, we explain why demand-side constraints on market power apply to all of the ILEC's network elements in general, while supply-side constraints can be analyzed at the level of specific network elements.

A. Supply-Side Effects Influence the Unbundling of Specific Network Elements

132. From a supply-side perspective, the correct way to assess whether an ILEC has the ability to exercise monopoly power is to ascertain the following: If the ILEC attempted to restrict its supply of a given network element to increase the price of end-user services above competitive levels, would *other providers* increase their supply of that network element or competing network elements sufficiently to defeat the attempted price increase? If competitors have no barriers to expansion or can access the network element from an alternative source, then the ILEC cannot exercise market power in the end-user service market by restricting the supply of a given element.[213] Typically, a competitor providing a network element will have no binding capacity constraints, and it will be able economically to increase its supply of a given

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Technology Industries, 43 ANTITRUST BULL. 801, 820-22 (1998).

213. The following analysis responds to the FCC's request for "comment on when we should deem a substitute sufficiently available so as to render access to the incumbent's network element unnecessary." *See SFNPRM, supra* note 1, at ¶ 21; *see also id.* at ¶ 24 (asking "how the Commission should consider the availability of network

element at current prices because it already would be supplying the element. Since marginal costs are not increasing for provision of network elements, a firm's current provision of a UNE will demonstrate its ability to expand supply.[214] Thus, for a given network element in which competitive supply exists, an ILEC will be unable to exercise market power in most situations.

133. The Supreme Court ruled in *Iowa Utilities Board* that the Commission needed to consider the availability of network elements from alternative suppliers to the ILEC in determining whether the ILEC's supply of a particular network element met the "necessary" and "impair" standards.[215] Thus, an economic analysis of the expected supply of a given network element would be required for the Commission to make a reasoned determination. Because of the underlying technology of network elements, where fixed costs are high relative to marginal (or variable) costs, the economic incentives for non-ILECs that have entered the market to expand their supply will be very high. With high supply elasticity from competing firms, the ILEC will not likely be able to exercise market power in the supply of network elements.

134. Our impairment test is necessarily stated in the abstract. Regulators attempting to employ our standard, however, may require simple, objective market characteristics that would serve as proxies for constraints on an ILEC's ability to exercise market power. With respect to supply-side substitution constraints, two market characteristics should be incorpo-

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elements outside of the incumbent's network").

214. Indeed, marginal costs are either constant or decreasing for most UNEs. Otherwise, we would expect to see numerous small competitors entering the market to supply UNEs.

rated. First, regulators should examine whether a CLEC is self-supplying the element in question in the relevant geographic market. If at least one CLEC is supplying the element in question, the ILEC cannot exercise market power in the end-user services market by restricting access to that element. If the element is not competitively supplied, regulators should next examine the nature of the costs of the network element to determine whether the element *could be competitively supplied* in the short term. In particular, if fixed (as opposed to sunk) costs represent a large share of the total costs of the element in question, then the element should not be unbundled. As explained in Part II, as long as the asset can be redeployed in a different geographic market at little cost, the CLEC will face no exit barriers. Because low exit costs encourage entry, the regulator need not rely on unbundling of that network element to stimulate competition.[216]

135. Furthermore, as a network element becomes competitively supplied, TELRIC pricing better approximates the element's market value. But the proper measure of TELRIC incorporates the value of the option associated with the forward-looking nature of the investment.[217] The competitive price and the element's TELRIC converge to the same value when only fixed cost but not sunk costs are present in the element, because the value of the option under those circumstances converges to zero. Thus, we would predict a socially perverse relationship

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215. 119 S. Ct. at 735.

216. It is well recognized that a barrier to exit becomes a barrier to entry. For a discussion of the absence of exit barriers in the wireless industry because fixed investment is amenable to redeployment by other firms or in other geographic markets, see SIDAK & SPULBER, *supra* note 7, at 78-79.

217. To a limited extent, the Commission recognized this notion of cost in its 1996 interconnection proceeding. *See Local Competition First Report and Order, supra* note 8, 11 F.C.C. Rcd. at 15,824-33 ¶¶ 638-52, 15,849-52 ¶¶ 686-95 (discussing testimony of Jerry Hausman). For further discussion, see Hausman, *Valuing the Effect of Regulation on New Services in Telecommunications, supra* note 11; Hausman, *Regulation by TSLRIC,*

between the sunk-cost nature of the ILEC's network investment on the one hand, and the CLEC's demand for mandatory unbundling on the other hand. The more likely it is that TELRIC accurately approximates the market-determined price of an unbundled network element, the *less* likely it is that the CLEC will demand mandatory unbundling of that element, because the value of the free option granted to the CLEC by the Commission will be near zero. Conversely, the less likely it is that TELRIC fully compensates the ILEC for the option value of mandatory unbundling of a particular network element when sunk costs are important, the *more* likely it is that the CLEC will demand mandatory unbundling of that element at a TELRIC-based price. This perverse effect flows from the FCC's failure to recognize the substantial option value that is associated with the CLEC's right to compel sharing of the ILEC's sunk investments in network infrastructure. The effect of the option value on the CLEC's demand for mandatory unbundling is in addition to the "reverse *Cellophane*" effect described earlier, which holds whether or not the element in question embodies sunk costs.

1. The Supply of Existing Network Elements Listed in the *Local Competition First Report and Order*

136. We now consider how our impairment test would apply to the two most significant of the seven network elements listed in the *Local Competition First Report and Order*. The first such element, local switching, illustrates how our test would apply to an element with primarily fixed but not sunk costs. The second network element, an unbundled loop, involves a relatively greater degree of sunk costs. After we have shown how the analysis would differ between elements depending on their degree of fixed versus sunk costs, we then

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supra note 138.